08/28/17

Physics S1

Newtonian Physics

Physics S2

Electromagetic Spectra

Every day <u>each</u> <u>group</u> will need:

- **One physics textbook**
- **One computer**

Each activity includes:

WDYS

WDYT

Investigate

Physics Talk

Checking up

Physics to Go

Chapter 1: Driving the Roads

Chapter Challenge

12 pts - 2-3 min. talking (<2 min or >5 min, ea. 1 min -1 pts)

25 pts - relationship bet. braking distance, following distance, & total stopping distance, & factors that affect each
- connections between speed, friction, & radius of curve when turning

10 - graphs, charts, or posters (1 req'd) +7 pts ea. above req'd

5 - written report

24 pts - oral presentation score

76 pts

Section 1: Responding to Road Hazards (p. 8) 08/29/17

WDYS Blue speeding + not stopping in time, in the mtns, crash w/ car flipped + car on top of it, Blue's hat flew off, Blue's back end coming off of the ground, oil on street from accident,

WDYT Speed, attention not on driving, how close you are to vehicle ahead, brain processing delay, distracted, tired, emotions, personal reaction speed, talking, experience, weather, car condition, seatbelt, others' use of signals, your health, drugs/medicine

I will use multiple methods to measure and describe reaction time.

Section 1: Responding to Road Hazards (p. 8)

- I will use multiple methods to measure and describe reaction time.

Via

- Participating in collaborative experiments
- Team and whole class discussions to clarify key concepts
- Collaboratively answering questions targeting key concepts

Section 1: Responding to Road Hazards (p. 8)

Investigate:
Method B (10 min)
Reaction Time with Distractions (10 min)

I will use multiple methods to measure and describe reaction time.

Physics Talk (p.12)

Reaction time and distractions

Distractions make your reaction time longer
Some distractions are unavoidable
Some distractions are worse than others
Slower reaction times increase the chances of accidents

Other factors affecting reaction time

Legal and illegal drugs can affect reaction time
Be careful what you consume before you drive
Age, gender, practice, fatigue, exercise, attentiveness, + personality

I will use multiple methods to measure and describe reaction time.

WDYTN p.16
Physics to Go #4 (p.19), #7 & 8 (p.20)

Answer in full sentences.

Section 3: Average Speed: Following Distance and Models of Motion (p. 34) 08/31/17

WDYS
- Tailgating in front lane only
- Happy people in background
- 2 way street
- Maybe a highway
- Daytime
- Large body or water

WDYT
- 3 seconds (counting in mississippi's)
- A full car length or two car lengths
- More distance for faster speeds
- Obey the law
- Check surroundings
- Make a good hypothesis (educated guess)

I will use multiple methods to measure and describe speed, define and contrast average speed and instantaneous speed, and create and interpret graphs to understand and calculate speed.

Section 3: Average Speed: Following Distance and Models of Motion

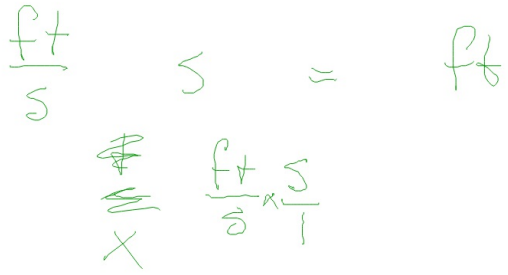
- I will use multiple methods to measure and describe speed
- Define and contrast average speed and instantaneous speed
- Create and interpret graphs to understand and calculate speed.

Via

- Participating in collaborative experiments
- Team and whole class discussions to clarify key concepts
- Collaboratively answering questions targeting key concepts

Section 3: Average Speed: Following Distance and Models of Motion

Investigate (p. 34)
#1-3 in groups
#4-6 whole class
#7-8 groups



I will use multiple methods to measure and describe speed, define and contrast average speed and instantaneous speed, and create and interpret graphs to understand and calculate speed.

Section 3: Average Speed: Following Distance and Models of Motion Physics Talk (pp. 37-46)

Constant speed - speed doesn't ever change

speed - distance traveled per unit of time $\frac{m}{s}$ m/s

when an object is moving at a slow speed, the distance between the object images is less than when the speed is faster

average speed = $\frac{\text{distance traveled}}{\text{time elapsed}}$ $v_{av} = \frac{\Delta d}{\Delta t}$

sloping/italics is used for quantity symbols

upright type is used for SI symbols

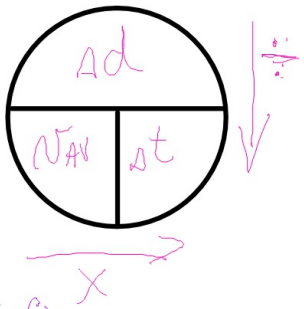
instantaneous speed - the speed measured at an exact moment

I will use multiple methods to measure and describe speed, define and contrast average speed and instantaneous speed, and create and interpret graphs to understand and calculate speed.

Section 3: Average Speed: Following Distance and Models of Motion Physics Talk (pp. 37-46)

$v_{av} = \frac{\Delta d}{\Delta t}$ $\Delta t = \frac{\Delta d}{v_{av}}$

$\Delta d = v_{av} \Delta t$



$35 \frac{mi}{h} \left(\frac{1}{60} \frac{h}{min}\right)\left(\frac{1}{60} \frac{min}{s}\right)\left(5280 \frac{ft}{mi}\right)$

$\frac{35 \cdot 5280 \text{ ft}}{60 \cdot 60 \text{ s}} = \frac{184800}{3600} \frac{ft}{s} = 51.\overline{3} \frac{ft}{s}$

Velocity is speed in a given direction and always includes both speed and direction

d (m) t (s) $v \left(\frac{m}{s}\right)$

I will use multiple methods to measure and describe speed, define and contrast average speed and instantaneous speed, and create and interpret graphs to understand and calculate speed.

Section 3: Average Speed: Following Distance and Models of Motion Physics Talk (pp. 37-46)

Doppler Effect – higher pitch as sound approaches, lower pitch as sound departs

Light frequencies appear lower as galaxies move away from us (red shift)

reaction distance – the distance traveled from when something occurs until you react to it

I will use multiple methods to measure and describe speed, define and contrast average speed and instantaneous speed, and create and interpret graphs to understand and calculate speed.

Section 3: Average Speed: Following Distance and Models of Motion

CU Checking Up: #1-4 (p.46)

PtG Physics to Go: #4-7, 12 (pp.49-50)

WDYS Guy running to the sidewalk, red car speeding – smoking, speed lines, front end elevated; yellow car more sedate pace, Lady on sidewalk avoiding street cars have a green light, ped. crossing when light changed – running to keep away from red car

WDYT Car gain speed faster than bus, bus is heaver therefore slower, Car is also much smaller than bus, bus needs more road to reach 30mph both accelerate, both use gas, both are stopped and accelerate to 30 mph, bus takes more than 10s to reach speed

Section 4: Graphing Motion: Distance, Velocity, and Acceleration

IWBAT

- Define acceleration using words and an equation;
- Calculate speed, distance, and time using this equation
- Interpret distance-time and velocity-time graphs for different types of motion.

Via

- Participating in collaborative experiments
- Team and whole class discussions to clarify key concepts
- Collaboratively answering questions targeting key concepts

Section 4: Graphing Motion: Distance, Velocity, and Acceleration Physics Talk (p.58)

acceleration is the change in velocity WRT the change in time

Constant acceleration is a straight line on a V-T graph

acceleration is a vector quantity

Vector – has both magnitude and direction

Change your velocity – increase velocity magnitude, decrease the velocity magnitude, change direction

negative acceleration – a decrease in the velocity in the direction of motion

positive acceleration – an increase in velocity in the direction of motion

IWBAT define acceleration using words and an equation; calculate speed, distance, and time using this equation; and interpret distance-time and velocity-time graphs for different types of motion.

Section 4: Graphing Motion: Distance, Velocity, and Acceleration Physics Talk (p.58)

☐ ☐ ☐ Zero acc.

☐ ☐ ☐ positive acc.

☐ ☐ ☐ negative acc

$a = \frac{\Delta v}{\Delta t} = \frac{v_f - v_i}{t_f - t_i}$ $\frac{m/s}{s}$ $m/s/s$ m/s^2

IWBAT define acceleration using words and an equation; calculate speed, distance, and time using this equation; and interpret distance-time and velocity-time graphs for different types of motion.

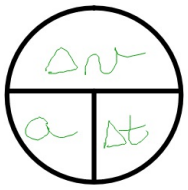
Section 4: Graphing Motion: Distance, Velocity, and Acceleration

"Acceleration is the change of speed."

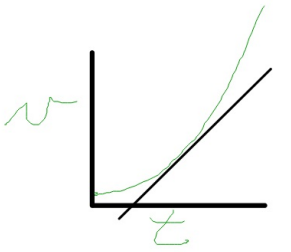
1. What is correct about this?
2. What can be improved?

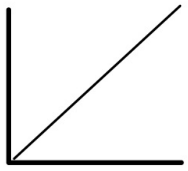
Section 4: Graphing Motion: Distance, Velocity, and Acceleration Physics Talk (p.58)

$a = \frac{\Delta v}{\Delta t}$ $\Delta t = \frac{\Delta v}{a}$ $\Delta v = a \Delta t$



$\frac{\Delta d}{\Delta t} = v$





Section 4: Graphing Motion: Distance, Velocity, and Acceleration

Checking up (p.64) #1-3
Physics to Go (p.68) #7, 9, 17

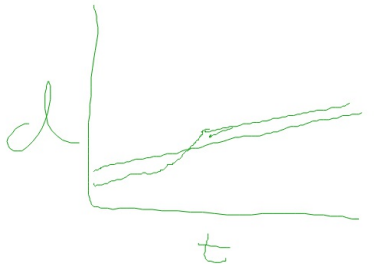
$$a = \frac{v_f - v_i}{\Delta t}$$

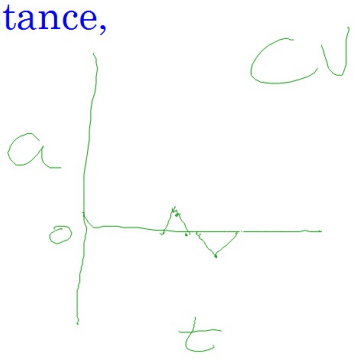
$$v_{av} = \frac{\Delta d}{\Delta t}$$

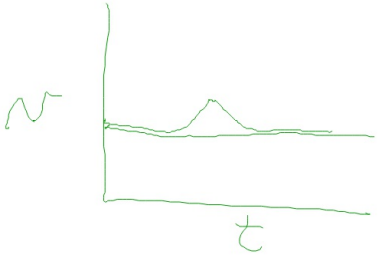
After conversing with one partner, answer the What Do You Think Now on pg. 66 and record your answer in the appropriate place on your WDYS document.

IWBAT define acceleration using words and an equation; calculate speed, distance, and time using this equation; and interpret distance-time and velocity-time graphs for different types of motion.

Section 4: Graphing Motion: Distance, Velocity, and Acceleration







IWBAT define acceleration using words and an equation; calculate speed, distance, and time using this equation; and interpret distance-time and velocity-time graphs for different types of motion.

Units

09/18/17

Mini-challenge (p. 72)
(40 min.)

Look over the requirements for the chapter challenge. As a team, write a paragraph for your challenge relating to the topics covered in sections one, three, and four.

With the remaining time of the 40 minutes, make sure you have updated your individual physics vocabulary resource for the first seven words listed for chapter 1 and any additional new words of which you wish to keep track.

Section 5: Negative Acceleration: Braking Your Automobile p.75 09/19/17

WDYS Red car about to hit a deer/moose. Driver smashed on his brakes, the road is by a forrest, Driver seemed to be going too quickly, the back of the car has lifted off of the ground, smoke from the tires, moose looks at driver as if driver is an idiot, driver has both hands on the wheel, red cape

WDYT distance between car + animal, speed you're going, the animal's position, your surroundings (esp. traffic), whether you can turn, other obstacles/animals, speed of the animal, size of the animal,

Section 5: Negative Acceleration: Braking Your Automobile p.75

I will

- Plan and carry out an experiment to relate braking distance to initial speed, determine braking distance
- Examine acceleration by seeing how varying the initial speed changes the braking distance.

Via

- Participating in collaborative experiments
- Team and whole class discussions to clarify key concepts
- Collaboratively answering questions targeting key concepts

Section 5: Negative Acceleration: Braking Your Automobile

Investigate p.75

your plan must include :

- Materials needed

- individual jobs (how will things be accomplished ?)

I will plan and carry out an experiment to relate braking distance to initial speed, determine braking distance, and examine acceleration by seeing how varying the initial speed changes the braking distance.

Section 5: Negative Acceleration: Braking Your Automobile

Physics Talk (p.78)

$a = \frac{\Delta v}{\Delta t} = \frac{v_f - v_i}{\Delta t}$

stopping $a = \frac{-v_i}{\Delta t}$

positive represents one direction and negative represents the opposite direction

Braking distance equation

$v_f^2 = 2ad + v_i^2$

$0 = 2ad + v_i^2$

$-v_i^2 \quad -v_i^2$

$\frac{-v_i^2}{2a} = \frac{2ad}{2a}$

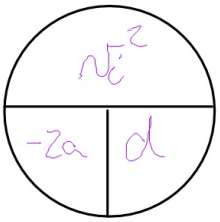
d = braking distance

$d = \frac{-v_i^2}{2a}$

I will plan and carry out an experiment to relate braking distance to initial speed, determine braking distance, and examine acceleration by seeing how varying the initial speed changes the braking distance.

Section 5: Negative Acceleration: Braking Your Automobile

Calculating Braking Distance



75 mph
55 mph

$\frac{75^2}{-2a}$ $\frac{55^2}{-2a}$

$\frac{55^2}{75^2}$ $\frac{3025}{5625}$ ≈ 54%

Checking up (p.82) #1-3
WDYTN (p.86)
Physics to Go (p.88) #2, 4, & 11

Section 7: Centripetal Force: Driving on Curves

p.105 09/22/17

WDYS No guardrail, car speeding, likely to die, curve warning sign, started to brake late, across yellow line, series of cars ahead, rocks falling towards the road, little trees, car half off the cliff, car hit sign

WDYT To prevent accidents / injury to driver because your car tips to one side if you're going too fast

Reaction time, obstacle or surface change, previous accident data

Section 7: Centripetal Force

IWBAT

- Recognize the need for centripetal force when rounding a curve
- Predict the effect of inadequate centripetal force
- Relate speed to centripetal force.

Via

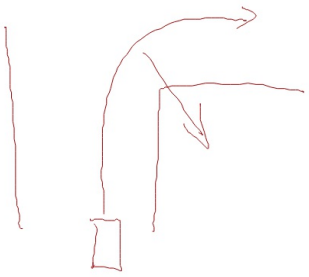
- Participating in collaborative experiments
- Team and whole class discussions to clarify key concepts
- Collaboratively answering questions targeting key concepts

Section 7: Centripetal Force

Investigate (p. 105)

There are three stations.

- Turntable
- Car on string
- Cork accelerometer



IWBAT recognize the need for centripetal force when rounding a curve, predict the effect of inadequate centripetal force, and relate speed to centripetal force.

Section 7: Centripetal Force

Physics Talk (p.109)

The car requires force to keep it moving in a circle (toy = string, block = friction)
When there is not enough force to continue the turn, the car goes in a straight path
Newton's First Law of Motion states that an object in motion will remain in motion at a constant speed in a straight line unless a force acts to change this
The force of friction is always towards the center of the circle
The road supplies friction with the tires to keep the auto moving in a circle

IWBAT recognize the need for centripetal force when rounding a curve, predict the effect of inadequate centripetal force, and relate speed to centripetal force.

Section 7: Centripetal Force

Centripetal force is a force directed toward the center of a circular path
Velocity does change based on direction
A change in the velocity based on a change in direction is centripetal acceleration

Checking Up (p. 110) #1-3, 6
Physics to Go (pp. 114-115) #3, 4, 7, 9, 12, 13
WDYTN (p. 112)

IWBAT recognize the need for centripetal force when rounding a curve, predict the effect of inadequate centripetal force, and relate speed to centripetal force.

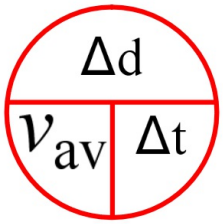
Chapter 1: Driving the Roads
Chapter Challenge (pp. 118-121)

Chapter 1: Driving the Roads

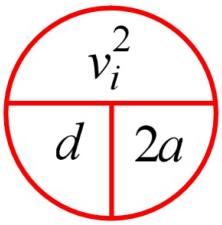
Due Friday, 9/29/17

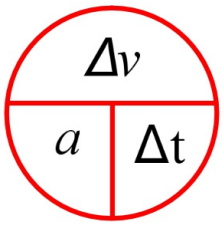
- Chapter Challenge presentation (team)
- Chapter 1 vocabulary (individual)
- Chapter 1 WDYS/WDYT (individual)
- Chapter 1 notebook (team)

$$v_{av} = \frac{(v_1 + v_2)}{2} \qquad v_{av} = \frac{\Delta d}{\Delta t}$$



$$d = \frac{v_i^2}{2a} \qquad a = \frac{\Delta v}{\Delta t}$$





$$C = 2\pi r$$

$$\text{Angular velocity} = C(\text{cm / rev}) \,/\, t(s \,/\, \text{rev})$$